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ON SOME OF THE CAUSES DETERMINING THE NATURE OF THE EFFUSION IN INFLAMMATION OF THE VISCERAL PLEURA, WITH REMARKS UPON THE PROPHYLACTIC TREATMENT OF EMPYEMA.

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IN order to an understanding of the proper subject matter of this paper, some preliminary remarks concerning the physiology of respiration and the pulmonary circulation are absolutely necessary.

Among the numerous aids to the circulation of the blood, accessory to the propulsive power exerted by the heart, that afforded by respiration is mentioned by most physiologists. With each inspiration a *vis a fronte* is evoked, without which it would almost seem as if the sluggish current in the venæ cavæ might, in certain states of adynamia, proceed to complete stagnation. No delicate experiments are needed to demonstrate this inspiratory force. When abolished by holding the breath, the veins of the head and neck swell visibly, while, on the other hand, the danger of the entry of air into the veins is one against which all surgeons are on guard during the performance of operations in the cervical regions. Although acknowledged as a valuable aid to the general circulation, the influence of this force upon the lesser or pulmonic circulation is not so manifest, and chiefly, perhaps, because the necessity of its assistance is not so apparent, owing to the comparatively short circuit traversed by the blood. Certain well-marked anatomical peculiarities of the pulmonary vessels offer strong presumptive evidence in favor of the view that inspiration is an important aid to the pulmonary circulation. These are the straight course of the vessels and the absence of anastomoses,—facts, however, which might with equal propriety be adduced as favoring the view that the heart is alone concerned in the propulsion of the blood, did not experiments definitely decide the question. Ludwig* found that blood injected into the pulmonary artery passed with difficulty when the lung was collapsed, quickly when it was moderately distended with air, and when fully distended the stream at first passed quickly but soon became slow. It is thus seen that the condition of lung most favorable to the pulmonary circulation is that of moderate distention, which obtains, in life, during the inspiratory act of tranquil respiration; while the condition least favorable is that of collapse,† an approximation towards which is made, during life, at the close of expiration.

Some further remarks concerning the mechanism of respiration cannot be dispensed with.

"The quantity of air which is habitually and almost uniformly changed in each act of breathing is called by Mr. Hutchinson *breathing air*. The quantity over and above this which a man can draw into the lungs in the deepest inspiration he names *complemental air:* its amount is various. . . . After ordinary expiration, such as that which expels the *breathing air*, a certain quantity of air remains in the lungs, which may be expelled by a forcible and deeper expiration; this he terms *reserve air*. But even after the most violent expiratory effort the lungs are not completely emptied: a certain quantity always remains in them over which there is no voluntary control, and which may be called *residual air*."‡

The above quotation deals with facts which, once presented, are admitted by all, and, for our present purpose, is valuable as affording a classification and nomenclature of the different volumes of air, stationary and fluctuating, concerned in the act of respiration. I prefer the term "tidal air" to that of "breathing air," and will substitute it in this paper.

In the earliest stage of pleurisy the nature of the respiration is altered. The costal type is, as far as possible, changed to abdominal, while the respirations are shallow and, consequently, increased in frequency. This is done instinctively, with a view to mitigate the pain produced by friction upon the inflamed pleura. Now it will be found, on experiment, that there are two principal methods by which the

* Wagner's Manual of General Pathology, p. 157.

† By the term "collapse" is here meant the post mortem condition of a healthy lung removed from the thoracic cavity.

‡ Kirke's Handbook of Physiology.

chest-walls can be maintained almost immovable and the respiration be carried on chiefly by the diaphragm.

In the first method the thorax is expanded; the inspiratory muscles are in a state of tonic contraction, and the gaseous interchanges are performed, not by means of the tidal air of normal respiration, but through the medium of what is normally the complemental air, and the reserve air is increased by the addition of the normal tidal. The lungs and the entire pulmonary circulation are permanently maintained in a position closely approximating to that which exists normally only at the height of inspiration.

The second principal method by which diaphragmatic respiration may be carried on while the costal type is suppressed is as follows: the inspiratory muscles are relaxed; the thorax consequently is retracted, and the shallow and rapid respirations are carried on either entirely by the normal reserve air or partly by it and partly by a portion of the normal tidal air. In either case the permanent condition of the lung and of the pulmonary circulation closely resembles that which exists normally at the close of expiration. This method is not so easily imitated as the former. For its proper performance a sharp pain in the side is essential; nevertheless any one who will make the experiment, especially in the recumbent position, will, I think, readily convince himself that such a mode of respiration, even in health, may be maintained for a considerable length of time. Of these two types of diaphragmatic respiration, the latter I believe, both on *a priori* grounds and from observation, to be the one that exists in all cases of acute pleurisy. The former type is rendered impossible by the great fatigue induced by tonic contraction of the inspiratory muscles, and the pain induced by tension of the inflamed pleura.

We have now to consider the state of the pulmonary circulation during expiration, and the probable effect of a continuance of that state in inflammation of the pleura.

Ludwig found, as has already been stated, that blood injected into the pulmonary artery passed with difficulty when the lung was collapsed,—that is, removed from the body. The amount of air contained in such a lung varies, other things being equal, according to the rigidity of the tissues composing it, being less in youth than in old age; but the condition of such a lung is not so far removed from that of the living lung at the close of expiration as might at first be supposed, "for, after death, the lungs are not so empty of air as after forced expiration during life."* We may, therefore, take this experiment of Ludwig as a guide to our inquiry. In stating that the blood passed with difficulty, no opinion or surmise is expressed as to the seat of obstruction, nor is there any statement, in Wagner's quotation, as to the kind of blood used in the experiment. The obstruction may have been in the arteries, capillaries, or veins. If arterial, it would be followed, in the living lung, by venous congestion, as has been shown by Cohnheim in his experiments upon embolic processes. If capillary, it would be equally followed by venous congestion, although with more participation on the part of the smaller arteries. Obstruction to the flow of blood at any point before the origin of the veins will lead to venous congestion. For proof of this I would refer to what takes place in the disease process known as cholera kidney. In the kidney, with its double set of capillaries, there is, in these minute vessels, an amount of resistance to be overcome greater, probably, than exists in any other vascular district of the body. It is in the capillaries of the gland that the first obstruction to the low blood-pressure of cholera is opposed, and this is immediately followed by venous hyperæmia. Finally, if the obstruction be venous, it will first affect the distal portion of the veins, and this would occur all the more readily as the pulmonary veins are destitute of valves.

I have thus endeavored to show that the lung assumes an expiratory position when its serous covering is inflamed; that, in this position, there is obstruction to the pulmonary circulation; and, finally, that this obstruction is especially manifested in the primary venous radicles,—that is to say, in that portion of the vascular system where our present knowledge teaches us the most essential part of the inflammatory process occurs, the migration of the white blood cells.†

It is not pretended that inflammation is in any sense of the word a mechanical process, but it is firmly held by the writer that there are certain physical properties

* Marshall's Physiology, American ed., p. 819.
† See Green's Pathology, 3d London ed., p. 208.

of the different tissues and organs that influence its progress and termination, if not its origin, and that they are not to be excluded from a proper consideration of its therapeutics. I have elsewhere shown that a high degree of elasticity is possessed by the kidney; and that this property has a regulating influence upon the secretion in health, and is not without influence upon processes, I think highly probable. The elasticity of the kidney was proved by a case in which the gland was the seat of a large inspissated abscess, and in which there was complete occlusion of the ureter. The pus, when fluid, must have occupied a much larger space, nevertheless the remaining cortex of the gland was closely applied to the inspissated pus, and its surface was not puckered. Nothing but elasticity could entirely account for such a condition. My concluding remarks upon this subject were as follows: "It must be borne in mind that the ureter was occluded, and, therefore, with the absorption of the exudation there was, as it were, a constant tendency towards the formation of a vacuum, which was prevented by the retraction of the encapsuling kidney. *It has clung to the disappearing exudation as the thoracic walls cling to the retiring lung.* In short, there are three factors capable of producing such a result, namely, the elasticity of the organ, the suction force above described, and, perhaps, some degree of cicatricial contraction."* The absence of puckering of the surface went to prove that elasticity was the chief factor concerned.

In considering pleuritic effusions I propose to treat of two varieties only, the purulent and the non-purulent, leaving out of consideration the hemorrhagic form, which is generally symptomatic of the hemorrhagic diathesis, of tubercular pleuritis, or of disease-processes in the pseudo-membrane analogous to those of pachymeningitis hæmorrhagica.

No sharp dividing-line can be drawn between purulent and non-purulent effusions, the difference between them depending solely upon the different quantities of pus-cells which they contain. In a clinical point of view, however, the difference is so great that two distinct affections are treated of, although their primary pathological processes are, in most cases, identical. It is rare that a pleuritic effusion is purulent from the start. Fraentzel says that "primary purulent pleuritis is of extremely rare occurrence. In almost every case the effusion is at first fibrino-serous, and it is during the subsequent course that it becomes, sooner or later, purulent, and this may occur as early as the first week."† The form of the disease in which the effusion is from the beginning purulent is known as "pleuritis acutissima," but it is exceedingly rare. Fraentzel had observed only three cases of it, although his attention had been called to the affection by Traube in the year 1860.‡

Since, then, in the great majority of cases, pleuritic effusions are at first non-purulent, a consideration of the causes leading to the purulent change is evidently of great importance, as through it alone can a treatment designed to prevent such change be rationally instituted.

The earliest manifestation of inflammation of the pleura is hyperæmia of an active nature, accompanied with exudation of liquor sanguinis, emigration of white blood-cells, and increased activity of the endothelial elements. The inflammatory stasis that speedily supervenes in the capillaries causes, by its obstruction, as I have endeavored to show in the foregoing pages, and as is proved by experiments upon the transparent tissues of animals, an early engorgement of the primary venous radicles, and this engorgement is still further added to by the expiratory position in which the lung is maintained on account of the pain. The conditions, therefore, are in the highest degree favorable to the emigration of white blood-cells,—that is, to the production of pus. The fact that the pulmonary vein contains arterial blood may be a provision of nature against this tendency to cell-migration, but it is the fibrin now flowing upon the pleural surface that opposes the principal barrier. Whether fibrin be a simple or compound substance; whether its origin be in the blood, as held by Rindfleisch, or in the inflamed tissues, as held by Virchow;§ whether it be nutritious or excrementitious, it is certain that this substance is apt to preponderate in the inflammatory products of serous inflammations occurring in robust persons. The migrating cells are entangled in its meshes

* Path. Soc. Trans., Phila., vol. vi. p. 90.

† Ziemssen's Cyclopædia, vol. iv. p. 611.

‡ See foot-note on p. 603, vol. iv., Ziemssen's Cyclopædia.

§ Rindfleisch's Manual of Pathological Histology, p. 259, Phila. edition.

before reaching the pleural cavity, and one of its offices here, as in the case of incised wounds, is undoubtedly the formation of a "*scaffolding*," by means of which the building up of the cells into fibres and blood-vessels may take place.

A further proof that fibrin interposes a barrier to suppuration is found in the fact that the first step in the conversion of a fibrino-serous into a purulent effusion is the dissolution of the fibrin deposited upon the pleura. In discussing the earliest steps of this conversion, Rindfleisch remarks, "Large shreds of the pseudo-membrane are loosened and detached from their resting-place, then to liquefy into pus."* Without pausing to criticise the expression "liquefy into pus," which may possibly be an incorrect rendering of the original text, I would particularly call attention to this first stage of empyema thus described by this eminent authority in pathology, as allusion will again be made to it in discussing the prophylactic treatment of empyema.

During the stage of the disease above referred to, the lung, owing to the pain, has been maintained in an expiratory position, and the rapid and shallow respirations have been carried on chiefly by the diaphragm. This is best observed in women, in whom the normal type is "superior costal." At the same time the rhythm of respiration is altered. According to Burdon Sanderson,† the rhythm of normal respiration is as follows: the whole respiration period being 15, inspiration occupies 4, expiration 2, and the pause 9 parts. In the jerky respiration of the acute stage of pleurisy it needs no other instruments than hand, eye, and ear to perceive that this pause is both absolutely and relatively shortened, and that inspiration and expiration are of about equal duration. In so far as the pause at the close of expiration is shortened, the effect in pleurisy upon the circulation, and through it upon the effusion, is conservative: nevertheless this is more than counterbalanced by the permanent expiratory position assumed by the lung.

There is another cause of the expiratory position of the lung, whose influence, at first scarcely felt, gradually increases until its limit, varying in different cases, is reached. This is the effusion, which also for the most part proceeds from the veins. According to the views advocated in this paper, the mechanical. compressing action of the effusion may be instrumental in propagating the inflammation. For example, we will suppose a pleurisy beginning at the apex of the lung attended with a moderate effusion. This effusion gravitates to the bottom of the pleural cavity, already predisposed to inflammation by the congestion produced by the expiratory position of the lung assumed on account of the pain. The effusion, by exerting a greater compression, will increase the congestion, and, in combination with other causes, may actually excite inflammation. If this theory be correct, a secondary pleurisy would arise at the base of the lung, and, proceeding from below upward, unite with the primary disease proceeding in the opposite direction. Such a theory, if true, would be hardly susceptible of proof, because it would be impossible to exclude the irritating qualities of the effusion.

The fact that empyema is generally, at the beginning, a pleurisy with fibrino-serous effusion, is suggestive in more ways than one. I have alluded to one of the methods by which this change may take place,—a change, I repeat, which, in a pathological sense, is merely one of degree. This is by the breaking up of the barrier of fibrin. Any cause leading to this unfortunate result will tend to convert the disease into empyema. These causes are such as interfere with the healing of wounds by first intention, where also a certain amount of fibrin is necessary to support the cells during their metamorphoses. Among these causes may be mentioned pyæmia, septicæmia, and the infectious diseases. If with any such, or similar conditions of dyscrasia, there is also an increase of the white blood-cells, the change to empyema is still further favored. Such a condition is found in scarlatina,‡ and in this affection empyema is by no means rare. I have met with a case, fully reported elsewhere, in which empyema supervened upon a prolonged attack of intermittent fever,—that is to say, during a condition of the system in which it is almost absolutely certain that there was not only increase of the white corpuscles but also diminution of the red.

Virginia S., æt. 24, was admitted to the

* Path. Hist., Am. ed., p. 269.
† Marshall's Physiology, Am. ed., p. 814.

‡ Ziemssen's Cyclopædia, vol. ii. p. 234.

Episcopal Hospital on September 27, 1874. Her illness, which had lasted about a year, began with a chill, followed by pain in the left side, cough, and swelling of feet and legs. She had suffered from *chills and fever* during the entire summer of 1873. It is, of course, necessary to be careful not to confound such *chills and fever* with the similar symptoms that often attend the process of suppuration. There was no doubt, in the case referred to, that the intermittent fever was of malarial origin, and the state of the blood thereby produced was manifested not only by the effusion of pus into the inflamed pleura, but also by the occurrence of œdema of the lower extremities at a very early stage of the case. The chills and fevers were not the hectic of phthisis, for at the post-mortem examination of the case, which was made January 7, 1875, the only indications were "a few caseous nodules at the right apex,"—an amount of disease often found at the autopsies of subjects that had not been considered phthisical during life. The empyema was on the left side, and the "lung was compressed into a firm oblong mass, not much larger than the fist, and lay in the upper and back part of the cavity, being closely bound down to the vertebræ."* This lung was carnified, but not the seat of caseous or tubercular deposit. Indeed, the occurrence of large effusion,—and at the third tapping of this case, for the purpose of inserting a drainage-tube, five quarts of pus were removed,—the occurrence, I repeat, of large effusion argues in favor of a comparatively healthy condition of lung at the beginning of the pleurisy, for it is self-evident that a solidified lung forbids any great accumulation of fluid in the pleura. A certain amount of inflammation of the lung exercises a conservative influence against the occurrence of effusion, and it is the opinion of the writer, founded upon the clinical study of pleurisy, that in acute cases, where the fibrinous element largely preponderates and the fluid effusion is small, there is generally a decided amount of inflammation of the peripheral parenchyma of the lung; that is to say, the case is one of pleuro-pneumonia. When there is large effusion, on the other hand, the inflammation is more strictly confined to the pleura. I admit, however, that this interesting point is one demanding further study.

But the most interesting question in connection with the origin of empyema is, whether a serous effusion may, by its mere pressure, keep up such a degree of venous congestion as to lead to sufficient cell-emigration to convert the effusion into pus. That a certain degree of pressure has the effect of keeping up the inflammatory process until the subserous connective tissue is extensively involved, and a granulating, pus-discharging surface formed in the site of the pleura, is, I think, highly probable, but the degree of this pressure cannot be ascertained even for a single individual, and it probably differs in all. Pressure of the effusion, independent of the continuance of inflammation, according to its amount, produces one of two effects. One degree, by the peripheral venous congestion it produces, promotes effusion; a still greater degree prevents it entirely, and the fluid arrives at a state of stagnation, by which I mean that it is neither added to nor diminished. This is the condition met with in many chronic pleurisies when they first come under our notice. The disease-process appears to have come to a complete stand-still, and, if we choose to so consider it, this counter-pressure upon the blood-vessels, by which further effusion is prevented, is an instance of the much-vaunted "*vis medicatrix naturæ.*" Apart from its absorption, the duration of this stationary condition of the effusion depends upon two things: the power of resistance of the patient, and, if the effusion be purulent, the supervention, or not, of necrosis of neighboring tissues. If such necrosis is accompanied with inflammation, the fluid may increase before it perforates; in the absence of fresh inflammation, there is no further effusion. Withdrawal of the fluid, or a portion of it, by relieving the walls of the vessels from counter-pressure may again place them in a condition favorable to further effusion. On the other hand, it may also place them in a condition favorable to absorption; and that this condition is probably largely mechanical, is proved by the following quotation from Dr. Bowditch's paper on Pleuritic Effusions:† "Dr. Wyman assures me that he operated in one case of chronic pleurisy eight or ten times, and there was no permanent relief until the last puncture, at which less fluid was drawn off than at any

* Path. Soc. Trans., Phila., vol. v.

† Am. Jour. Med. Sci., April, 1852.

previous one, and yet the patient apparently obtained greater relief from it than from all the others."

Dr. Bowditch attributes the recurrence of effusion after repeated tapping to a "habit of effusion gained by the pleura." From this "habit" he infers the early removal of the fluid, and is, I think, in most cases, entirely correct in his inference. Still, the argument founded on "habit," although leading to a correct result, is not sufficiently convincing: one naturally demands something more in the way of a reason. That the degree of pressure upon the exterior of the walls of the vessels has a great influence upon the process of absorption, either inhibiting it, not opposing it, or favoring it,—as it is well known that pressure favors osmosis,—is, I think, indubitable. At the same time, this opinion, it must be remembered, is founded upon the supposition that the walls of the blood-vessels are healthy; and that they are so, after prolonged compression of the tissue surrounding them, is highly problematical. Although not strictly analogous, I may here refer to Cohnheim's experiments in interrupting the circulation through the renal artery. After removal of the ligature the veins became dilated, and from them there issued an abundant emigration of white blood-corpuscles together with blood-plasma.* It was an alteration in the nutrition of the vessels that led to this result, and a similar alteration may attack the walls of the blood-vessels of the lung after prolonged interference with their supply of blood by a large pleuritic effusion. Such a disease of the blood-vessel walls would serve to explain the numerous cases in which what was a serous effusion at a first tapping or aspiration has been found to be purulent at a second or third. These changes in the walls of the veins, consequent upon a prolonged interference with the circulation, are of an extremely delicate nature, for Cohnheim "was never able to discover the slightest alteration in the minute histological structure of vessels that had been thus a long while deprived of the contact of the blood that should have circulated through them."† The fact of the conversion of a serous into a purulent effusion after operative interference is notorious, and has been attributed to the admission of disease-germs, and to the traumatic irritation of the pleura, but neither of these explanations can withstand criticism, for similar interference with other serous cavities is not followed by the same result. The effect is partly mechanical, the counter-pressure being withdrawn to such an extent as to favor exudation, and partly vital, owing to a change in the walls of the vessels, more especially of the smaller veins.

It would appear, on superficial consideration, that if the prolonged duration of the effusion favor its purulent metamorphosis, all cases of pleurisy, after a certain length of time, should be converted into empyemas, or at least that cases of empyema should be of a more chronic nature than those in which the effusion is fibrino-serous. But the question is not so simple. A serous effusion, if sufficiently large to prevent by its counter-pressure any further effusion, may remain serous indefinitely if not interfered with. This is not the case with a purulent effusion, whose tendency is to seek an outlet in the direction of least resistance. I began the analysis of a series of cases with the object of comparing the chronicity of the two affections, but abandoned it after becoming convinced of the negative nature of the evidence thereby afforded. I submit the figures, however, as they possess a certain degree of interest.

In vol. xxvii. of the Medico-Chirurgical Transactions is an article on paracentesis thoracis, by Hamilton Roe, M.D., of London, which contains two sets of tables, the first containing thirty-nine cases, being all that had been "published in the English language between the years 1812 and 1832, inclusive," the second containing twenty-four cases of paracentesis performed under his own observation or that of his friends. Of these sixty-three cases twenty-nine were cases of empyema and twenty-six cases of "inflammatory hydrothorax,"—that is, pleurisy. Leaving out one case of empyema of seven years' duration and one of pleurisy of three years', and one of sero-sanguinolent effusion, I obtained for analysis twenty-five cases of empyema and twelve of pleurisy, in which the duration of the disease previous to operation was given. The result was that the average duration of the empyema cases was ninety-eight days and that of the pleurisy cases ninety-seven days.

In Guy's Hospital Reports for 1877 is an article on empyema, by Dr. James Good-

* Ziemssen's Cyclopædia, vol. xv. p. 230.
† Ibid., p. 224.

hart, containing a table of seventy-seven cases of empyema treated by operation. It is made up in nearly equal proportions of cases treated at Guy's Hospital during the preceeding ten years, and of similar cases treated at the Evelina Hospital for children since its foundation in 1869. Although not available for any present purpose of comparison, it is interesting as showing the more acute course and greater frequency of the disease in children. Leaving out the cases in which there were sinuses on admission and those in which the duration of the disease was doubtful, I obtained thirty-three cases occurring in children ten years of age or under, and twenty-six in individuals over that age. The first set gave an average duration of forty-nine days; the second, of sixty-nine days.

I am aware that there are numerous sources of fallacy in all such statistics, and it was this conviction that induced me to discontinue my researches in this direction.

It is the opinion of most authorities that the chronicity of a pleurisy is no proof of its purulent nature, or, at least, that it affords no guide to diagnosis. In the volume of the *American Journal of the Medical Sciences* for 1852 are two admirable articles upon the subject of pleuritic effusions, one in the January number, by the late Dr. Pepper, of Philadelphia, the other in the April number, by Dr. Bowditch, of Boston. In discussing their diagnosis, Dr. Pepper says that the chronicity of the effusion affords no guide, while Dr. Bowditch remarks, in the same connection, "The chronic nature of the complaint affords no criterion by which to judge." This is true in a certain sense, not so in another, for in an acute case there is, as a general rule, little question of pus, while in a chronic case this question always arises. The acute cases, with moderate effusion, are generally cured by medicinal treatment. The prognosis of complete uncomplicated pleurisy is good. In fact, there are two well-marked diseases, clinically speaking, under the head of pleurisy, an acute and a chronic affection, and under the second head comes empyema, so that the duration of the affection does afford some guide to diagnosis. That Dr. Pepper believed in the power of time, in combination with other causes, to convert a pleurisy into empyema, appears from the following remark concerning the first case reported in his paper: "In the above case it would appear that the acute pleurisy, contracted in the spring of 1842, was, from neglect or inefficient treatment, allowed to degenerate into chronic empyema." Time may, in most cases, be said to predispose to empyema, and especially in the class of hospital patients, in whom other depressing causes are almost invariably associated. There is one theory regarding the conversion of a serous into a purulent effusion for which time is essential, viz., that which attributes it, in great measure, to continued subdivision of its contained leucocytes. This theory is held by Fraentzel, and partially admitted by Rindfleisch: nevertheless I am not willing to ascribe to such a cause any great degree of influence in the conversion of serum into pus. If such a cause were commonly operative, empyema would be much more commonly met with. The process of cell-division has its limit, and once the cells are suspended in the effusion, and freed from any further nutritive influence other than that supplied by the fluid surrounding them, that limit is probably very soon reached.

Another cause leading to large effusions of serum, and predisposing to empyema, is probably congenital. The extent of the respiratory movement differs in every individual, and is known as the respiratory or vital capacity; and the point of thoracic equilibrium, the pivot, as it were, upon which these movements turn, of necessity also differs. It is highly probable, for example, that if this centre of movement be congenitally high and, at the same time, the respiratory capacity be small,—if, in short, owing to the individual idiosyncrasy, the thorax be maintained in a position of inspiratory expansion,—there is a strong predisposition to the development of emphysema. This is the theory of emphysema advocated by Freund,* who attributes the inspiratory position to a nutritive lesion of the costal cartilages, although he considers it as acquired rather than congenital. If, on the other hand, the point of thoracic equilibrium be congenitally low, and the respiratory capacity small, a tendency to venous congestion in the pulmonary venous radicles is part of the constitutional inheritance of the individual, and a pleurisy attacking such a subject would, in accordance with the views here-

* Ziemssen, vol. v. p. 359.

with submitted, be probably attended with large serous or purulent effusion. Corroboration of this theory would not be found in an antagonism between emphysema and pleurisy, if such could be shown to exist, as emphysema also predisposes to venous congestion, for it will be remembered that in Ludwig's experiment, when the lung was greatly distended with air, the blood-stream at first passed rapidly but soon became slow. These two conditions of lung, the inspiratory and the expiratory, in their effect upon the circulation, afford an instance of the meeting of extremes.

It remains to be considered what therapeutical deductions are to be drawn from the preceding general principles. In the present paper, this question is limited to the inquiry whether we have any means at our command by which we can prevent the degeneration of a fibrino-serous into a purulent effusion.

As regards a prophylactic treatment based upon the shape of the thorax and the want of development of the respiratory muscles, there is little to be said, for if general considerations of health do not lead to the proper development of this part of the body by judicious exercise, the possibility that an attack of pleurisy occurring in such an individual may degenerate into an empyema will certainly not do so.

The earliest symptom of acute pleurisy pain is to be combated with a full dose of some preparation of opium. There has been much discussion regarding the influence of pain in disease, the result of which has been, in many cases, the decision that pain, *per se*, exerts a positively injurious effect upon the local affection. Such statements should be received with caution. When, after the administration of a full narcotic dose, an inflammatory disease is speedily recovered from, the first question should be, What is the natural duration of this disease? A few cases of painful inflammation speedily recovered from under full doses of narcotics are not sufficient to settle this important question. There is at least one important principle concerned, which is this: when pain *through its interference with function leads to congestion*, its removal exerts a direct curative influence upon disease; otherwise its removal can exert but an indirect curative influence through the general nervous system. In pleurisy, as I have endeavored to show, pain, by its interference with function, promotes congestion, and its removal, in that it permits of a freer movement of the lung, is the first indication. Such a doctrine would, at first sight, seem opposed to the usual treatment of inflammation by rest, but this rest is always qualified by the phrase, "in the proper position,"—that is to say, in a position calculated to diminish venous congestion. Position is more important than rest.

Experience has already shown the value of opium in the earliest stage of pleurisy, but the therapeutics that is founded upon experience solely, although perhaps the best, does not command universal assent, because the nature of the experience, its amount and quality, have always to be taken into consideration; but if this experience can be shown to have been founded, although perhaps unconsciously, upon the most fundamental pathological processes of the affection, the authority of experience is such as to command assent. Until this is done, valuable time will be lost, and lives perhaps endangered, by mere tentative experiments in other therapeutic directions, by those ambitious to discover specifics, and also by those—a numerous class—who on all subjects instinctively range themselves upon the side of the opposition.

The question of bleeding is one of great importance. That bleeding is beneficial in the earliest stages of pleurisy, in many cases, there can, I think, be no manner of doubt. Such is the universal testimony of most clinical teachers during the first half of this century, and this testimony it is impossible to refute without a resort to the extreme position of a change in the type of disease. But in order that good may result from bleeding, it is not to be resorted to without great discrimination. In the first place, its use should be confined to the first stage. For the purpose of promoting absorption of the effused fluid, we have agents quite as efficacious as bleeding, and free from its disadvantages. The influence of bleeding for good or evil in pleurisy can only be thoroughly appreciated by a close study of the pathology of the disease. In the earliest stage of pleurisy the fibrinous barrier to suppuration is forming upon the pleura, but forming slowly, as it is the nature of fibrin contained in inflammatory blood to coagulate slowly, although the coagulum once formed is of the densest kind, in order to oppose suppuration to the utmost extent. Bleeding will hasten

the coagulation of the fibrin, as it is well known that in venesection the blood first withdrawn coagulates more slowly than that last drawn, but the clot will not be so firm. It becomes a question, therefore, whether more will be gained by venesection and the consequent rapid formation of a layer of fibrin of loose texture, than by the slower formation of a denser layer, such as would be the effect of leaving the process to nature. It is a question requiring careful and prompt decision, as after the first twenty-four hours little can be expected from bleeding. Bleeding acts favorably also by diminishing pain and thereby favoring the freer movement of the lung. As regards the form of bleeding, I give the preference to wet cups applied over or near the seat of pain, as in this way probably the greatest relief will be obtained. Bleeding should not be resorted to except in the case of robust individuals. In anæmic individuals, where bleeding cannot be resorted to, the chief reliance is to be placed upon opium and quinia. It has been shown that quinia diminishes the amœboid movement of the white blood-cells, and so it is inferred that it is opposed to suppuration. Whether this be so or not, it is perhaps our most valuable antipyretic and tonic, although its value as an antipyretic in the fever of inflammatory diseases has not been, in my experience, so great as in the fever of the infectious diseases. I do not think it necessary to administer it in the earliest stage of acute pleurisy occurring in robust people, relying chiefly in those cases upon opium and wet cups.

The prophylactic treatment of the effusion—that is, the treatment designed to prevent its purulent degeneration—is medicinal and surgical. The chief drug to be relied upon is quinia, both with the object of preventing further cell-migration and for the purpose of preventing further activity in the cells contained in the effusion. Surgical treatment is not to be instituted while the effusion is in the acute stage and rapidly progressing. In Bowditch's eighth case,* tapping was resorted to on the seventh day of the disease and thirteen ounces of serous fluid were removed: five days afterwards "the signs of effusion were fully as great as at first." The case recovered eventually without subsequent tapping, was well on the thirty-ninth day, and probably would have done as well under medicinal treatment alone. But when the effusion has ceased and has remained stationary for some days—it is, of course, impossible to lay down any absolute rule as regards time—the removal of a small proportion of the fluid by aspiration is indicated. My own experience would lead me, in the absence of any alarming symptoms of dyspnœa, to wait at least a week after the effusion has become stationary, before resorting to aspiration. The energetic employment of counter-irritants, diaphoretics, such as jaborandi, or its alkaloid used hypodermically, and diuretics, is generally followed by a rapid reduction of the serous effusion, and a gradual restoration to health, provided the case has been properly treated from the beginning.

The treatment of purulent effusions does not come within the scope of this paper.

* Am. Jour. Med. Sci., April, 1852.

HOT WATER AS A HÆMOSTATIC IN SURGERY.

Read before the Philadelphia County Medical Society, October 8, 1879.

BY CHAS. T. HUNTER, M.D.,

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IT is doubtless a matter of common observation among surgeons that recent wounds, and more especially those made by operation, oftentimes bleed profusely, even after all the larger vessels have been secured by ligatures or other mechanical means. This tendency to parenchymatous hemorrhage may be due to several causes, among which are a hemorrhagic diathesis, local obstruction to the venous circulation of a part, the temporary paralysis of the vaso-motor nerves, the reaction consequent on return of consciousness from a state of profound etherization, etc.

Wounds made by operations performed with antiseptic precautions seem, likewise, to show a decided predisposition to profuse oozing, and the same condition obtains whenever Esmarch's apparatus is relied on to control hemorrhage during an operation. The dilatation of the vessels of a part that has been the seat of a morbid growth should also be enumerated among the causes that favor this variety of hemorrhage.

In many instances parenchymatous hemorrhage ceases spontaneously before the larger vessels are secured; but, on the other hand, it may obstinately persist till

the life of the patient is brought into jeopardy, unless some means are resorted to that will promptly check the continuous outflow of the vital fluid. Now, in the treatment of this form of hemorrhage the question naturally arises, What agent has the surgeon that will quickly and thoroughly arrest the escape of blood from the large number of vessels, scattered over the surface of the wound, too small for ligatures, and will, at the same time, have no injurious influence on the subsequent progress of the case?

It will, I think, be generally conceded that the means heretofore used do not fully meet these requirements. The routine treatment usually followed is, first, to try the effects of exposure of the wound to cold air and repeated douches of very cold water; then, if these comparatively harmless means fail, some of the various styptics are called into requisition. The virtues of these hæmostatics reside in the properties possessed by them of exciting contraction of the vessels and the tissue in which they lie, and of producing coagulation of blood in the patulous extremities of these vessels, thereby affording a mechanical obstruction to the further escape of blood. So far as the hæmostatic effects of these agents, especially the so-called chemical styptics, are concerned, they are generally all that can be desired; but, in consequence of their specific action in recent wounds, union by the first intention is rarely ever obtained when they are employed: therefore any hæmostatic apparently free from this important objection is certainly worthy of a fair trial.

During the past winter I saw several notices, in the current medical journals, of the efficacy of hot-water injections as a means of controlling uterine hemorrhage, and it occurred to me that the same agent might be equally serviceable as a hæmostatic in general surgery. Fully impressed with this idea, I determined to test the supposed hæmostatic virtues of hot water in the first favorable case that presented itself. I had not long to wait for the desired opportunity, for on the 4th of March, 1879, J. P., an engineer in the employ of the Pennsylvania Railroad Company, was brought to the University Hospital with one of his legs so terribly crushed—the result of a railroad accident that had occurred some six hours previously—that immediate amputation was deemed necessary. As soon as the necessary arrangements had been made for an operation, I proceeded to amputate the leg at the upper third, making a short anterior skin and a long posterior musculocutaneous flap. In consequence of the enormous size of this patient's thigh,—the man himself weighed something over two hundred and thirty pounds,—I was unable satisfactorily to control the femoral artery with an ordinary tourniquet: therefore, in order to give greater security against hemorrhage, I encircled the limb just above the knee with Esmarch's elastic tube. After having secured the main arteries with catgut ligatures I had the elastic tube and the tourniquet removed from the thigh, when profuse parenchymatous hemorrhage immediately followed from all parts of the large wound. Vessel after vessel was ligatured, till twenty-five ligatures were applied, but without completely checking the hemorrhage. It now became evident that other means than ligatures would have to be used. This patient had lost considerable blood before his admission, which fact, combined with his extremely depressed condition, consequent upon the operation and prolonged etherization, made me doubtful as to the advisability of drenching the stump with cold water, with a view to stopping the oozing; for, under the circumstances, this treatment would have had the effect of lowering his bodily temperature, thereby increasing the tendency to secondary shock. The peculiar conditions of this case at this stage led me to believe that here was a capital opportunity for testing the efficacy of hot water as a hæmostatic: thereupon I had some hot water brought into the ward, which I proceeded to apply to the oozing surface by means of a sponge. After three or four applications of the water, as hot as I could bear without pain, I had the satisfaction of seeing the wound blanch and all bleeding cease. I then was able to close the wound without further delay.

Soon after this I received the February number of the London *Practitioner* for 1879, which contained an interesting paper on "Hot Water as a Hæmostatic in Surgery," contributed by Charles B. Keetley, Assistant Surgeon to the West London Hospital. In this paper Mr. Keetley claims to have used hot water to check oozing, in a case of amputation of a thigh, as long ago as July, 1878, and in several cases of epistaxis, with decided success.

Dr. F. H. Hamilton, of New York, in a communication to the ***Buffalo Medical and Surgical Journal*** for April, 1879, speaks of having applied hot water at almost boiling temperature, by sponges held in forceps, to recent wounds, for the purpose of arresting parenchymatous hemorrhage. Water at this high temperature, Dr. Hamilton maintains, acts promptly by shutting up the small vessels, and does not prevent union by the first intention. The testimony of two such high authorities in favor of the employment of hot water as a hæmostatic served to confirm the views that I had already independently formed concerning the efficacy of this agent, and made me especially desirous of a more extended experience in its use.

On May 26, 1879, a lad æt. 17 was admitted to the University Hospital on account of avulsion of his right arm at the shoulder-joint. This extremity, together with the integuments overlying the corresponding scapula, was torn off by a rapidly-revolving cotton-picker, on which he had accidentally fallen. The wound resulting from this horrible accident was so extensive that, before its edges could be brought together, I found it necessary to dissect out the uncovered shoulder-blade, thereby making the operation an amputation above the shoulder-joint. Profuse parenchymatous hemorrhage immediately ensued; but, as I had kept close to the scapula while separating it from its attachments, no vessel worthy of a ligature had been cut. After waiting a few minutes and detecting no visible diminution in the quantity of blood escaping, I called for some very hot water, and applied it to the surface of the wound by compresses. Three renewals of the hot compresses sufficed to arrest entirely the oozing, and left the wound in condition to be closed at once.

During the past summer I have had repeated opportunities of testing the efficacy of hot water in the treatment of parenchymatous hemorrhage, and in not a single case have I been disappointed in its prompt action where it has been properly applied.

In the use of this remedy certain rules must be observed, for otherwise failure will be sure to follow, and, as a consequence, unmerited neglect of a valuable surgical aid will be the result. As may be imagined, the determination of what the temperature of the water should be is a matter of the greatest importance, for if it be too low the water will serve to keep up the bleeding; if too high, the part to which the water is applied may be scalded or otherwise injured. The majority of obstetricians who have tried this hæmostatic in cases of uterine hemorrhage are of the opinion that the water ought not to exceed 110° F. I am not prepared to question their opinion, for I have never seen hot water used as a means of controlling hemorrhage in cavities; but my experience, thus far, has taught me that this temperature is much too low for checking parenchymatous oozing from external wounds. In hurriedly making use of hot water to check bleeding, I have always depended on my own sensations rather than on a thermometer for regulating the temperature. I never put on a wound a compress or sponge wet with water in which I cannot bear my hand. In taking the temperature of water not sufficiently hot to scald, I ascertained that it varied from 125° to 130° F. In raising the heat by gradually pouring in boiling water, I found that I was not able to keep my hand in it as the temperature approached 135° F.

It would appear, however, from the recorded experience of one or two observers, that this degree of heat is not considered sufficiently high. Dr. Paul R. Brown* states that he has injected into a recent wound water of a temperature of 160° F. without any unpleasant consequences following, and Dr. Hamilton† alleges that he has made use of water almost boiling, to check general oozing. According to both observers, primary union is in no way interfered with by this exceedingly high temperature. To me this is a matter of some surprise, for it is reasonable to suppose that a degree of heat (*i.e.*, 160° F.) sufficient to coagulate albumen would scald living tissues and excite a grade of inflammatory action in the wounded part incompatible with union by the first intention. But if water of 125° or 130° F. be as prompt and efficient in its hæmostatic action as that of 160° F. or higher, I can imagine no good reason why the higher temperature should be preferred to the lower.

The best manner of applying this agent to a bleeding surface, in order that its peculiar effects may be realized as quickly

* Phila. Med. Times, August 30, 1879, p. 569.
† Buffalo Med. and Surg. Journal, April 1879, p. 328.

as possible, is a matter that deserves some consideration. In a case of parenchymatous hemorrhage the blood escapes from innumerable small vessels; hence this hæmostatic,—viz., hot water,—to be effective, must be used in such way that all the bleeding points may be reached before it has lost its heat. If hot water be squeezed from a sponge or be poured over the surface of a wound, it will quickly lose its heat by radiation, and consequently its peculiar styptic property in direct proportion. Compresses made of muslin, linen, or towels, of a size sufficient to cover the whole wound, are the readiest and most effective means of conveying hot water to all parts simultaneously. A wet compress of this character, laid smoothly over a wounded surface, will quickly take up the blood as it flows from the patulous vessels, and, at the same time, conduct the heat to their cut extremities and the surrounding connective tissue. To get the full effect of moist heat it is essential that one compress be quickly succeeded by another. Not more than a minute or two should be allowed to intervene between the changes. Frequent reapplications of hot compresses are rendered necessary by the fact that a compress that has lost several degrees of heat will, if kept on a wound, tend to encourage rather than to arrest parenchymatous oozing.

In a few cases, perhaps, after one or two renewals of a compress, blood will be seen escaping from two or more points; these vessels ought to be ligatured, for the stimulus of the heat, in all probability, will not be sufficient to close them.

To what extent hot water may be depended on in secondary hemorrhage I cannot state, for I have had no personal experience with it in this variety of hemorrhage. That it will promptly arrest the bleeding that not unfrequently attends the downward progress of malignant ulceration as a most dangerous complication I have been assured by Dr. Wm. Hunt, of this city, who has repeatedly tried it in a case of scirrhous ulceration of a breast, which he has under treatment at the present time. This extension of its application is a matter of the highest importance, for it enables a surgeon to place a safe and efficient styptic, one that is always easily procured and may be readily applied, in the hands of an attendant of a patient suffering from some form of malignant ulceration, who may be in hourly danger of suddenly losing his life from hemorrhage.

Probably in no class of cases is the superiority of hot water as a styptic over cold more marked than in those of threatened shock, and exhaustion from hemorrhage, consequent on a prolonged and bloody operation. In such cases repeated drenchings of the wound with ice-cold water for the purpose of checking parenchymatous hemorrhage have the effect of lowering the bodily temperature, and, to an equal extent, weakening the natural recuperative powers. On the other hand, hot water not only acts more promptly as a hæmostatic than cold, but likewise adds materially to the general temperature of the body, and thereby tends to ward off "the depressant action of a serious operation."

When I first began to use this styptic I was exceedingly curious as to what might be the subsequent progress of wounds treated with it. I have been much gratified, however, to find that serous oozing is increased in no appreciable degree, and that final union of wounds is not in the least retarded.

The many advantages that hot water possesses as a hæmostatic over the chemical styptics, so far as its influence on healing is concerned, will be sufficiently obvious to those who have had any practical experience in the use of these agents.

As is the case with many other remedial agents, no satisfactory physiological explanation of the hæmostatic action of hot water has as yet been offered. I am disposed to believe, however, that this agent performs the part of a local stimulant, acting either directly on the vital contractility of the vessels and the connective tissue in which they are imbedded, or indirectly on the vessels through the agency of the vaso-motor nerves. The promptness with which hot water will check profuse parenchymatous hemorrhage in a case in which Esmarch's apparatus is used, would seem to confirm the theory that this hæmostatic acts by stimulating the vaso-motor nerves; for it is pretty generally conceded that the elastic bandage and tube, by their pressure, produce temporary suspension of the function of the nerves that control the calibre of the vessels.

In conclusion, I desire to say that, in consequence of the uniform success that has attended the use of hot water in my

practice, both hospital and private, during the last seven months, I feel that I am justified in thus recording my experience with it, and I venture to hope that some of my hearers may be induced to give this simple hæmostatic the fair and impartial trial that it would seem to deserve.

TRANSLATIONS.

TRANSVERSE INCISION OF THE SOFT PALATE AS A PRELIMINARY IN THE EXTRACTION OF NASO-PHARYNGEAL POLYPI.—Baekel, of Strasburg (*Bull. Gén. de Thérap.*, vol. ii., 1879, p. 282), uses a scraper, introduced by the wound or by one of the nostrils. To arrest the hemorrhage he uses a porcelain galvano-cautery, so as to avoid cauterizing the neighboring parts. The wound of the palate may be united by two or three silver sutures, or may be left open for the escape of discharges. The transverse incision of the palate gives greater facility for the operation than the antero-posterior incision. There is more bleeding, indeed, but this may easily be controlled. Anæsthesia is always possible.

IGNIPUNCTURE IN ŒDEMA.—M. Laboulbène recommends that in œdema from cardiac or renal disease, openings should be made in the swollen limbs with heated points instead of lancets, etc., in order to avoid gangrene about the openings.

ARTIFICIAL PRODUCTION OF CONGENITAL ATROPHY OF THE SPLEEN.—E. Masoin (*Acad. Roy. de Belgique; Le Concours Méd.*, 1879, p. 81) extirpated the spleen in a male and female rabbit and allowed them to propagate. The result of this experiment, repeated thrice, appeared to be that the spleen of their progeny became decidedly reduced in volume, so that it is probable that a series of extirpations, practised on succeeding generations, might produce complete atrophy of the spleen. More recent experiments show this to be a correct view, since a rabbit, the progeny of splenotomized parents, has been examined while in the full activity of digestion, and the spleen found reduced to a thin tongue of tissue.

CUTANEOUS ERUPTIONS PRODUCED BY CHLORAL.—Martinet (*Thèse de Paris*, 1879) arrives at the following conclusions: 1. The ingestion of chloral excites, in a certain number of individuals, an exanthematic eruption, which may be called chloralic erythema, a sort of scarlatiniform eruption. Some observers have described urticarial and purpuric chloral rashes. 2. The erythema from chloral is seated chiefly upon the face, neck, and front of the chest, neighborhood of the larger articulations on the extensor surface, backs of the hands and feet, etc. It appears after meals or after drinking alcoholic liquors. Most frequently fever is absent and the duration of the eruption is brief. 3. It is accompanied by dyspnœa and by cardiac palpitations, often severe. 4. It occurs in persons predisposed to its influence. 5. It seems to be due to vaso-motor paralysis, as also are the dyspnœa and palpitations which accompany it. In a number of cases recently reported to the Société Clinique, by Mayor, and those noted by Martinet, the eruption seemed to relapse from time to time, even after the discontinuance of the chloral.

CHROMIDROSIS.—Dr. G. Camuset gives an account of this curious and rare disorder, followed by notes of a case (*Le Mouvement Méd.*, 1879, p. 419). According to Camuset, the affection is almost always observed in women, and manifests itself by a slate-black discoloration of the skin in various regions, chiefly the lower eyelids. Sometimes it extends to the middle of the cheek and to the upper lids, symmetrically, on both sides. It has been observed on the chest and elsewhere in localities where the sweat-glands are abundant. The exudation is composed of an amorphous, blackish substance, of strong coloring power, like soot. Under the microscope the fragments look like bits of dried varnish. This material is derived from the glomeruli of the sudoriparous glands: it has nothing in common with the pigment of the rete Malpighi. The color of the material varies in intensity in different cases, and according to the condition of the individual. It is worse at the menstrual period. The affection may last from a few months to several years, with occasional intermissions and remissions. It leaves the lower eyelids last of all localities attacked. Young women are most usually the subjects of chromidrosis. Treatment is to be directed against the general debility accompanying the affection. Dr. Camuset gives notes of the case of a young girl of feeble health, who presented the eruption in its typical form. She was cured by the use of tonics, etc.

PHILADELPHIA
MEDICAL TIMES.

PHILADELPHIA, NOVEMBER 22, 1879.

EDITORIAL.

GRATUITOUS TREATMENT OF CLERGYMEN.

IT has long been etiquette among physicians, how long we do not know,—always, perhaps,—to treat clergymen without remuneration. In the opinion of the laity, a doctor's fee, no matter how small it may be, seems out of proportion to what he expends or gives for it. The line or two of hieroglyphics and the dozen words of advice are all-powerful for life or death, but they cost the doctor nothing at the time they are given, although the giver may have spent thousands of dollars on his education. A certain annual income is, then, necessary in order simply to pay the interest on what his knowledge has cost him. Moreover, we have always contended that the better the physician's education, the more valuable is his advice, just as the labor or the opinion of a master workman is worth more than that of his apprentice or half-developed journeyman. But while in the one case the laity see the logic of this argument and are willing to pay for it, concerning the highly-educated physician there is a spoken or tacit opinion that he demands too much. When danger has passed, the smallest fee is grudged, the animus being that of the old French couplet, which signifies that while he is needed the doctor is an angel, but when his bill is presented he is a—(the contrary).

In eighty cases out of one hundred, a doctor whose opinion is worth having not only earns his fee, but, in view of what he really gives for it, is underpaid. Like other human beings, he has his baker, his grocer, his butcher, his tailor. Like them, too, he has bills to pay. He may be no mathematician, but he has sufficient algebra to be aware that o will not pay for *x*. What wonder, then, that he sometimes feels himself an abused and unappreciated individual!

When he received his diploma, perhaps he took the Hippocratic oath which requires him to listen to the plea of the sick poor, and, if he have a human heart, he finds pleasure in healing their ills for the sake of that untold satisfaction which is the reward of relieving suffering. It is *his* method of giving in charity, and only he knows how much and how often he thus gives, and gives willingly. But when he is called upon to give gratuitously where there are larger means of payment than are represented by his own income, he involuntarily feels wronged, and wonders how the man of income equal to or larger than his own can accept much and give nothing. This is the position in which he is placed when called upon to attend many of our city clergymen and their families.

If the physician attends church,—and let us hope he does,—he assists in paying his minister's salary. If he marries,—and let us again hope he does,—he pays his minister a fee which five times exceeds what he would ask for granting the clergyman a similar amount of time. In case of death in his family, he perhaps would hardly feel comfortable unless he sent his minister a fee for his services at the funeral. Now, the *real* question arises, why should *he* not receive a reward for his services when the minister calls for them?

There is no kind of doubt that in this superannuated, unworthy custom of gratuitous medical treatment of *all* clergymen there exists a rank injustice. If the minister is poor, his family large, his salary small, who should be more ready than the large-hearted physician to give of his medical largess? But when the clergyman is getting three, four, or five thousand a year, there is no justice whatever in his being a eleemosynary institution.

FEES.

THE question of medical fees is one that occurs to most medical men at least twice a year, and seems never to reach an absolutely satisfactory settlement. It is plain that the poor cannot pay at a sufficient rate to support the doctor, and that the rich must make up the deficiency; but where and how is the line to be drawn? Arbitrarily the physician, in most cases, decides his rate for the individual patient, for only to a few of the topmost members of our profession is it given to have a fixed, invariable charge, which all who pay at all must pay or do without the services. In making out his bills, the physician, even if he have some schedule not altogether arbitrary, is forced very often to resort to shrewd guessing as to the pecuniary ability of his patient, and, with his best endeavors, does not always reach a just conclusion.

The Manchester (England) Medico-Ethical Association has adopted the rental of the patient's home as the basis of charging, dividing all recipients of medical services into four classes, the first where the rental is $50 to $125; the second, from $125 to $250; the third, from $250 to $500; the fourth, above $500. The charges for ordinary visits are—to the first class, 37 to 87 cents; to the second, 87 cents to $1.25; to the third, $1.25 to $1.87; to the fourth, $1.87 to $2.62. It also commends strongly the sending out of monthly accounts. The adoption of this latter procedure would, we believe, be a decided gain for the profession in this country; but, unfortunately, its introduction must come through the old established members of our guild, and it is just such men who need least such procedure, and who will be least apt to take the initiative.

As of old an angel at certain seasons descended into the Pool of Siloam and troubled its waters, so into the placid stream of the Obstetrical Society in this city does an angel—the female practitioner of medicine—at times descend and agitate things generally. In fact, when she dons her poke-bonnet and seizes her manuscript and specimens, there is consternation in the obstetrical ranks. To an outsider there is much reason for the perturbation of the venerable body, for is it not the carefully-perfected and cherished ladder by which the male obstetrician mounts aloft to professional reputation and success? his trumpet through which he blows the story of his power and triumphs? Can even motives of gallantry—powerful though with him they ever be—move him to surrender it up to the feminine champion, whose claim is so extensive that, if granted, he might be left without a round on which to stand? Still, the world moves, and perhaps some future Darwin may yet chronicle the result of the struggle, and from the "survival of the fittest" draw a new illustration of the "descent of man" and the ascent of woman.

We are gratified to notice the introduction into this city of a desirable enterprise, not uncommon abroad, which provides for wealthy persons, in the quiet of a home, the important advantages of a hospital, such as a resident physician, experienced nurses, a prescribed dietary, etc., etc. This institution is open to the regular profession, and for either medical or surgical cases. It is especially adapted for private patients from without the city, who in hotels or boarding-houses are usually so badly cared for. The house is conducted by Dr. Livingston, of 260 South Sixteenth Street, who was for several years Assistant-Physician to the State Lunatic Asylum at Utica, New York. We trust this (to Philadelphia) novel project may have the support it eminently deserves.

Application in Aphthous Stomatitis.—
℞ Pulv. sodii borati,
Pulv. acid. salicylici, āā ʒi;
Mellis, ʒiij.—M.

LEADING ARTICLES.

THE RECENT EPIDEMIC OF PLAGUE IN ASTRAKHAN.

A LEADING article in the *Philadelphia Medical Times* of March 1, upon the plague in Russia, described the progress of the epidemic up to that date, and alluded to the fact that medical commissioners had been sent from Germany, Austria, and England, charged with the duty of examining into the disease upon the spot and reporting the results of their investigations. The chairman of the German Commission, Professor Hirsch, of Berlin,—the great authority upon the plague,—has recently made a statement, in the form of a lecture on "The Plague Epidemic of the Year 1878–79 in Astrakhan," delivered before the Berlin Medical Society, and reported in the *Berliner Klinische Wochenschrift* and the *Medical Times and Gazette*, which may be read with profit as perhaps the best account of the late epidemic which has as yet appeared. It will be remembered that the late outbreak of plague had been predicted by Professor Hirsch in 1877, and, as he had made especial study of the disease, he was detailed, together with Drs. Küssner and Sommerbrodt, to proceed to Vetlianka, the centre of the outbreak. The Commission arrived at Vetlianka towards the end of February, and proceeded, with the aid of the Russian authorities, to investigate what remained at that time of the epidemic (which had almost expired), and to trace, so far as was possible, the course of the disease.

Astrakhan, the province in which Vetlianka is situated, forms a large steppe or treeless plain, traversed by the Volga, which runs between low clay banks. The climate is variable, with cold winters and hot summers. Cattle-breeding is carried on extensively, but fishing and salt-production are the two principal sources of industry. The general condition of the inhabitants is comfortable. The towns and villages seen by the Commission in their journey over the steppe were all remarkable for the excellent arrangement of the streets, which are large and well ventilated, and for the comfortable and well-arranged construction of the houses. It is true that the places for cleansing and salting fish were far from being in good hygienic condition, but this state of affairs had lasted for many years without having previously given rise to disease. The prevailing diseases of that district of the Volga are malaria, inflammatory attacks of the respiratory organs, rheumatism, syphilis, and scrofula. Of epidemic diseases observed during the last ten years, scarlet fever, typhoid fever, and cholera have been most conspicuous. The last outbreak of plague had occurred in 1807–8, and had probably been brought by pilgrims from Mecca. It had not been very severe.

The medical administration of the province appears to be very complicated and ineffective, the local surgeons being men of mean attainments, and superior army medical officers only being sent for in cases of emergency. The amount of red tape is such that the central government did not get any news of the epidemic until the worst was over.

The plague was confined to six places, the centre being Vetlianka,* where alone the disease existed with the character of an epidemic. On the whole, there were three hundred and fifty nine deaths from plague at Vetlianka during the whole period of the epidemic, which lasted from October 1, 1878, to January 4, 1879. As the population of the place is only about seventeen hundred and fifty individuals, this gives a mortality of twenty per cent. in the whole number. Of those attacked, eighty-two per cent. died. The total number of deaths from plague in the district is estimated at four hundred and fifty.

Unfortunately, the Commission arrived so late on the ground that no severe cases of plague were observed. Much of their information was derived from trustworthy and intelligent eye-witnesses. With regard to the nature of the disease, Professor Hirsch states that there can be no doubt about its nature: it was decidedly the ordinary Levantine bubonic plague. The lung-affection had not the character of pneumonia, but of pneumorrhagia; no complication with pneumonia or with bleeding from the lungs was observed. In a few cases only slight bronchitis seems to have been observed as a complication. As in all former plague epidemics, there were three forms to be distinguished, according to the degree of development of the disease. The first form was slight, partly

* For a general view of the topography of the country, the sketch-map in the *Times* for March 1, 1879, may be consulted.

without fever, a sort of ambulatory plague, where, without any other grave symptoms, a bubo was formed in the axillary, inguinal, or submaxillary glands, which soon suppurated or resolved, and where the whole process was terminated in that way. Cases of this form seem to have been more frequent especially in the beginning and towards the end of the epidemic. Of those, a few were seen by the Commission. But, secondly, there was a series of cases of a graver character, where buboes were formed after an illness of several days, and where the whole organism was deeply affected. Most of the buboes in those cases became purulent, and recovery was only exceptional. A third series of cases was observed in the form of the so-called *pestis siderans*, where no localization of the morbid process in the lymphatic system was formed at all, or the buboes were so small that they escaped the attention of the surgeons and the friends of the patients. Such cases proved fatal, without exception, in two or three days. No post-mortem examinations were made during the epidemic.

As regards the origin of the disease, Professor Hirsch says that it either originated spontaneously in Vetlianka, or was imported from another place; and in the latter case it must have been brought directly or indirectly from Persia or Mesopotamia, because in those countries only had the plague showed itself during the previous year. There is no reason whatever for the assumption of an autochthonic origin of the disease in the Volga districts. He believes, in fact, that the source of the plague epidemic in Vetlianka in 1878–9 was infected clothing which had found its way from Persia or Mesopotamia into Armenia, and possibly into some bazaar at Erzeroum or Kars, where it had lain unpacked. This clothing then probably fell into the hands of Cossacks as booty, and was sent home by them unopened to Vetlianka, which is a staritza or Cossack station, of which there are eighteen in Astrakhan. It is certain that Armenian booty did reach Vetlianka, and also that the infection of plague lingers long in clothing which has been worn by those sick of the disease.

This, it will be remembered, was the hypothesis which we offered in our leading article of March 1, to which reference has been made.

PROCEEDINGS OF SOCIETIES.

PHILADELPHIA COUNTY MEDICAL SOCIETY.

A CONVERSATIONAL meeting was held at the hall of the College of Physicians, Philadelphia, October 8, 1879, Prof. Henry H. Smith, President of the Society, in the chair. Dr. Charles T. Hunter read a paper (see page 89) on "Hot Water as a Hæmostatic in Surgery," which received a vote of thanks from the Society.

Dr. John H. Packard said that he could add his testimony to what had been said as to the value of hot water as a hæmostatic in surgical operations, and would endorse it even to a greater degree than the lecturer had. In a recent attempt to remove a tumor from the antrum, of the nature of a polypus, which had grown principally outwards, so that it was covered with a mere shell of bone, he had adopted the hot water as a hæmostatic with perfect success, so that this usually bloody operation was performed without the profuse bleeding that was expected. When the floor of the antrum was exposed there was pretty free hemorrhage, but on applying a sponge wet with hot water directly to the surface the bleeding immediately ceased. It was also effective in checking the hemorrhage from the cut surface of the lips in the earlier stage of the operation. He had resorted to it in a number of instances with success. In the operation of tying the external iliac artery the continual welling up of blood is a constant source of embarrassment. Performing this operation not long ago, he had noticed that by applying sponges dipped in hot water the oozing was prevented and the wound was kept in a clean condition, which was very desirable in making the dissection. Only the last week, while performing an amputation of the leg, he had found it to accomplish fully all that Dr. Hunter had claimed for it.

Dr. M. O'Hara remarked that the temperature of the water recommended to be used for injection in uterine hemorrhage is from 118° to 120°, and therefore hotter than that named by the lecturer by nearly ten degrees. He also called attention to the manner of application of the agent in obstetrics, where it is thrown against the bleeding surface with some force and in considerable quantity. He inclined to the opinion that this manner of application by the douche might be more efficient than by sponges or fomentations, since in the latter case the heat is rapidly lost as soon as applied. When the use of the thermometer is inconvenient, the temperature of the water may readily be tested by the back of the hand. From experiments made at the Woman's Hospital of this city, it was ascertained that the highest temperature that could be borne in this way without pain corre-

sponded usually with about 118° of Fahrenheit's scale.

Dr. Hunter replied that at the late meeting of the British Medical Association at Cork, the gentlemen attending the gynæcological section gave as the result of their experience that the temperature of the water should not be above 110°. He knew that it had been used hotter for the same purposes in this country, but he had arrived at his conclusions as to the proper temperature to be employed in surgery only after careful comparison, observation, and experiment.

In regard to the manner of application, he was in the habit of making a thick compress, large enough to cover the entire surface of the wound. This is made of towels, and after dipping in the water is applied to the entire surface simultaneously. He was confident that much less heat is lost in this way than by the stream of water delivered from the syringe or douche. He had tried both methods at the University and Pennsylvania Hospitals, and preferred the method recommended in the paper.

Dr. Charles B. Nancrede said that he had adopted this expedient in a number of cases during the last few months, with complete satisfaction. In a case of whitlow, where he had been called upon to remove the ungual phalanx, the parts were very vascular and bled freely. The application of ice did not check the hemorrhage, but the hot water stopped it instantly. In two cases of lymphadenoma of the neck that he had removed recently, requiring careful dissection, the hot water checked the bleeding so as greatly to facilitate the operation. He also referred to a case of partial amputation of the foot for old disease, where the parts were very vascular and congested, but the hot water prevented hemorrhage. In secondary hemorrhage it is also useful, and he communicated a case where there was a tendency to hemorrhage and bleeding, recurring for several days, in spite of ordinary styptics, but which was permanently checked by hot water.

Dr. W. R. D. Blackwood inquired if any member had seen injurious constitutional impressions from the use of hot water as a hæmostatic. The application must make a powerful impression upon the nerves of the part, and might increase the shock after surgical operations. He asked this question because, in a recent case of threatened post-partum hemorrhage occurring in a habitual flooder, he had used the hot injection as recommended at a previous meeting of this Society by Dr. Albert H. Smith, and he was certain that the shock which made its appearance within fifteen minutes after the injection was due solely to the hot water. The patient appeared to be in a state of serious collapse, but recovered by the liberal use of stimulants. The hemorrhage was checked, however, and the woman actually lost less blood than in an ordinary labor. He had also noticed in one of the medical journals that a practitioner in one of the Southern States had decided trouble in gynæcological practice after the hot-water injections.

Dr. Hunter stated that he had never seen any bad effects from it. In a recent case of exstrophy of the bladder, operated on by Dr. Levis, at the Pennsylvania Hospital, in which there was a very large wounded surface, the capillary bleeding was fully controlled by the hot water, and no bad results followed, but the child recovered very nicely from the effects of the operation, although prolonged etherization had been required.

Dr. Henry H. Smith called attention to the use of hot oil as an application to check hemorrhage in military surgery previous to the introduction of the ligature by Ambrose Paré. He inquired of the lecturer what was the physiological action of liquid or moist heat.

Dr. Hunter had recently seen a reference to this use of hot oil by Paré, in a paper by Thirsch. He had not been able, however, to find any satisfactory account of the physiological effects of the hot application in any of the journals. The only reference to the use of hot water as a hæmostatic he knew of was in *The Practitioner* for February, 1879, in a communication from Charles B. Keetley, F.R.C.S., Assistant-Surgeon to the West London Hospital.

Dr. W. H. Parish had used the hot water in gynæcological practice, in hemorrhage from the uterus or vagina, with the effect of promptly checking the bleeding. In regard to bad consequences, he had seen three cases of severe uterine colic from the use of hot-water injections,—just as severe as though cold water had been used. He had not thought that the hot water entered the uterus, but that colic occurred simply from the excess of heat, and the friction or impinging of the douche upon the cervix.

Dr. Hunter remarked that as the result of some experiments upon sensation he had found that he was able to take water as hot as 140° into his mouth, but not above this, without pain. He could hold his hand in water of 130°; the back of the hand is rather more sensitive, as observed by Dr. O'Hara, and as he had also found stated in Küss's Physiology.

Dr. George Hamilton said that the method proposed for the arrest of hemorrhage by means of hot applications was not only different from, but was apparently antagonistic to, the action of cold, hitherto so generally employed for this purpose. The lecture of this evening, novel, interesting, and important in its practical aspects, shows, in connection with other statements made during the discussion upon this subject, that this is not the case. More than forty years ago, while practising in the country, a nurse had spoken to him (Dr. Hamilton) of the successful applica-

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tion to the hypogastric region of a hot folded napkin, by order of the attending physician, for the arrest of uterine hemorrhage, when the ordinary measures had failed. Cold water, suddenly dashed upon the abdomen, in post-partum hemorrhage, is known to be one of the most effectual methods for arresting the discharge. The shock to the nervous system by this procedure is evident from the shivering or chill that at once ensues, and, as a sequence, diminished action of the whole vascular system. The *rationale*, when a very hot application is suddenly made, may be of the same character, for here, just as is seen in case of severe burns or scalding, chills or rigor may ensue, and here again a partial paralysis of the heart and vascular system occurs. Water of a high temperature, used for the suppression of hemorrhage in surgery, —to which object the lecturer has given his particular attention this evening,—or injected into the cavity of the uterus, acts, no doubt, as was stated in the lecture, locally, by producing coagulation, as well as by reflex action of the nervous system.

Dr. Nancrede attributed the hæmostatic effects of the application of hot water partly to the coagulation of fibrin by the action of heat, and partly to the stimulating influence upon the vaso-motor nerves.

Dr. Benjamin H. Lee inquired whether the year 1875 was regarded as the date of the introduction of hot water into obstetric practice.

Dr. Hunter replied that in the discussion at Cork, before referred to, it was so stated, he thought, by a gentleman named Kerr; but Dr. Stillwell, of San Francisco, states that three years before he saw Dr. Marion Sims throw hot water upon a raw surface to check bleeding.

Dr. Lee said that about twenty years ago a paper by a distinguished physician of New Orleans was published on the "Use of Hot Water as a Hæmostatic," in which he had personally felt much interest. He believed the paper could be found in the early transactions of the American Medical Association.

Dr. Henry H. Smith could not recall having seen such a paper in the transactions.

Dr. J. T. Eskridge explained the physiological action of the hot water through its action on the nervous system and as an irritant to the parts. He did not think it directly favored the coagulation of fibrin, for this will take place at, and is assisted by, any temperature below 160° and above the freezing-point, but a much higher temperature would prevent its coagulation.

Dr. William B. Atkinson said that he recalled the fact that in 1867, while he was assistant editor of the *Philadelphia Medical and Surgical Reporter*, a paper was presented by a Dr. Neville C. Read, of this city, in which he recommended the use of hot water as an agent for checking hemorrhage. The editor of the journal, the late Dr. S. W. Butler, refused to publish the paper, on the ground of its being impracticable and visionary.

Dr. Charles K. Mills said that the hæmostatic effect of the hot water is principally owing to its effect on the vaso-motor nerves. Two classes of cases occur in which there is general vaso-motor spasm: in one there is extreme pallor and coldness of the extremities, and in another set there is vaso-motor paresis, with passive congestion and sudden flooding of the parts by the blood. These can be treated by heat, electricity, stimulants, etc. In considering the local effects of the hot water it appears that the action is a direct one, and occurs independently of the vaso-motor centres. There is little doubt that there exists in the spinal cord a series of vaso-motor centres besides the well-known centre in the pons and the higher cerebral vascular centres. In the sudden application of hot water there is a powerful impression made upon the peripheral nerves, which is subsequently carried to the spinal cord, and may thus stimulate the vaso-motor centres into reflex action. In cases of hemorrhage due to vaso-motor paresis the good effects of the hot water may be explained in the same way.

Dr. O'Hara did not believe that the effect of the hot water could be explained altogether by nervous influence, because in that case it would be temporary, and the bleeding would return when the nerves resumed their functions. Coagulation must occur to stop the bleeding permanently.

Dr. J. L. Ludlow inquired whether the lecturer had observed anything like shock in his cases.

Dr. Hunter said that his first impression had been that the effect was a reflex one, through vaso-motor influence; he now regarded the hot water as acting more particularly as a local stimulant to the arterioles and the connective tissue in which the vessels lie. Undoubtedly the permanent occlusion of the vessels depends upon the formation of clots, although the heat is also capable of producing a profound nervous impression. He had often used the hot bath as a stimulant to the circulation, with good results. In a case of angina pectoris he had always succeeded in giving complete relief by a bath rapidly raised from 98° to 110°; immersion of about ten minutes entirely removing the oppression around the heart, and alleviating the other urgent symptoms.

In regard to the action of hot water upon the vaso-motor nerves, he said that Mr. Druitt* had recommended hot applications for excessive perspiration by sponging the surface with water at 130°, but for immersion the heat must be less; prolonged applications cause the surface to become red and congested.

* On the Use of Hot Water as a Remedy in Profuse Perspiration, in the *Medical Times and Gazette*, March, 1865.

Upon a raw surface water of 110° will close the open mouths of the capillary vessels as the first action; but if continued for several minutes it would probably produce the contrary effect and lead to profuse hemorrhage, as he had observed that the prolonged action of hot water seems to produce a condition of turgidity of the vessels lying immediately beneath the surface.

A CASE OF CALCAREOUS DEGENERATION OF THE MEMBRANA TYMPANI.

Dr. Chas. L. Turnbull presented a patient of about 26 years of age for examination, with calcareous degeneration of membrana tympani. The symptoms consisted only in slight impairment of hearing; there was no history of any previous suppurative action or earache. Dr. Turnbull also exhibited a plate representing this condition, which had been colored for him, while in Vienna, by Dr. Adam Politzer, the author of most of the literature of this disorder.

The calcareous deposit takes place primarily in the middle lamina of the membrane, as in the case under discussion, the mucoid and epidermal layers generally escaping; although Politzer has seen cases where these other layers have participated in the change, and in some the deposit consisted of bony substances. The condition has been found coexisting with gout or rheumatism, and may accompany chalky deposits in the auricle and the fingers. No evidence of this kind could be obtained in the present case beyond the fact that the patient believed that he had been scrofulous in childhood.

A vote of thanks was unanimously passed by the Society to Dr. Hunter for his valuable paper, and to Dr. Turnbull for his interesting remarks. The Society then adjourned.

PATHOLOGICAL SOCIETY OF PHILADELPHIA.

THURSDAY EVENING, SEPTEMBER 25, 1879.

THE PRESIDENT, DR. H. LENOX HODGE, in the chair.

On some of the causes determining the nature of the effusion in inflammation of the visceral pleura, with remarks upon the prophylactic treatment of empyema.

DR. FREDERICK P. HENRY read a paper with the above title (see page 81).

Dr. TYSON said one well-known cause of pleuritic effusion had not been referred to by Dr. Henry,—that is, a change in the composition of the blood, such as occurs in Bright's disease, where there has been a loss of albumen, and a consequent watery state results. Such blood is very prone to pass out through the vessels into serous cavities, as well as into the subcutaneous connective tissue.

Dr. O'HARA thought that the theory proposed was too mechanical to explain all the cases of pleural effusion. He had seen cases of empyema discoverable while the patient was walking about, without any previous notable symptoms of pain, fixity of the breathing apparatus, etc. He had seen, two years ago, notably one case of pleural effusion without apparently any other symptom in the patient than general debility and a gradual filling up of the left pleural sac. It became distended to a degree requiring removal, which, with the assistance of Dr. Willard, was done by the aspirator to the amount of five pints. In three weeks this, with tonics, enabled the patient to go to his work. About four weeks afterwards the same thing occurred on the right side, and three pints of fibrino-serous fluid were removed. The patient has remained well since. In this case there was no renal, cardiac, or liver trouble. He had slight cough, and from his debilitated condition tubercle was feared, but after-events showed this not to be the case. This case caused him to think that the portion of the nervous system presiding over secretion might, by a kind of paresis, cause an alteration in the quantity or quality of the ordinary fluid of the pleural sac. He had an idea that something similar might take place that you have from nerve-irritation, as in the exudation of herpes zoster.

Dr. MILLS said, in regard to the influence of the nervous system determining effusions, that it was known that in disseminated sclerosis, involving both brain and spinal cord, the patients have apoplectic attacks in which the lung symptoms become prominent; he had seen attacks like pneumonia in the first or beginning of the second stage, or like acute pleuritis, post-mortem examination revealing large effusions.

Dr. WILSON related a case illustrating the length of time that a pleural effusion may persist without becoming actually purulent. It was that of a young man who was taken ill with all the symptoms of an acute pleurisy. Shortly afterwards the signs of a large effusion of the left chest supervened. He was under treatment without operation, and in very poor health, for more than two years. At the end of this time, namely, in April, 1877, he came under Dr. W.'s care, and the fluid was evacuated by aspiration. It presented to the eye the appearance of a slightly-turbid serum, and under the microscope plates of cholesterin and leucocytes. The quantity was a trifle more than five pints. Eight months later, it had reaccumulated, and was again removed in the same manner, to the amount of a quart. The fluid at the second aspiration was of the same character as at the first,—sero-purulent. Since the second tapping there has been no reaccumulation.

It would be impossible to discuss fairly Dr. Henry's ingenious and elaborate paper at present, as it presented many points that were novel and not to be fully appreciated except

after careful consideration. He thought that those who were accustomed to study pleural effusions from the clinical stand-point looked upon the character of the effusion as to some extent at least determined by the condition of the blood, or, at all events, by something in the nutrition of the individual. It was his impression that conditions of cachexia, or even diathetic states, influenced unfavorably the character of the product in serous inflammation; and he narrated two cases of pleurisy in which an early operation led to the evacuation of fetid pus, both of which occurred in persons belonging to highly consumptive families.

Dr. SEILER said he had recently made a post-mortem examination in which there was found in the right pleural cavity a large amount of creamy pus; the lung was collapsed, lying against the vertebræ. The patient had died of diarrhœa. No symptoms of lung-trouble had been detected during life, with the exception of a change in the voice. This he thought an evidence of a large amount of fluid existing in the pleural cavity for some time without giving rise to any symptoms.

Dr. ESKRIDGE said, that the general circulation is influenced by inspiration and expiration, there can be no doubt; but that the pulmonic or lesser circulation is influenced by either, exclusive of the chemical change effected by these phenomena, he doubted.

The rapidity of the general venous circulation is increased during inspiration, because there is an effort to establish a vacuum in the thorax, towards which the venous blood is flowing. The rapidity of the general arterial circulation at the same time is decreased (or, what is the same thing, the pressure in the aorta is lessened), because these vessels carry the blood from the cavity of the thorax, in which, by the inspiratory effort, a vacuum is attempted.

As expiration upon the general circulation has just the opposite effect to inspiration, the rapidity of the general venous circulation is decreased and the arterial increased during expiration.

Since the general circulation is mainly outside of the cavity of the chest, and has its rapidity affected by respiration on account of certain mechanical phenomena which take place during this process, as the blood either flows to or from this cavity, he could not see how the mechanical movements of respiration could affect a circulation like the pulmonic, which is wholly within the chest.

We know that the blood well supplied with oxygen will circulate more freely than blood loaded with carbonic acid gas. In the healthy adult, from eighteen to twenty cubic inches of air enter and leave the lungs during every respiratory act. During the pain of pleurisy the chest-walls are not allowed to expand so freely as in health; less air, therefore, enters and leaves the chest during one respiration, the tissues soon call for oxygen, the blood is loaded with carbonic acid gas and effete matter, the number of respirations to make up for the deficiency of oxygen is increased; but, as each inspiration is now necessarily short, the blood is not sufficiently oxygenated nor relieved of carbonic acid gas to prevent the latter from increasing the morbid action already going on in the congested and inflamed pleura.

Dr. E. did not believe the mechanical movements of respiration directly affect the rapidity of the pulmonic circulation.

Dr. NANCREDE said in regard to duration being a cause of the fluid becoming purulent, he had had charge of a case in which there had been severe traumatic injury of the chest-wall, resulting in considerable general emphysema and collapse of the lung. The symptoms of the consequent pleuritis had been very violent. The fluid became encysted, and remained stationary for four months. In consultation with Dr. Starr, it was determined to draw off a small amount of the fluid with a hypodermic syringe for diagnostic purposes, when the exudation was found to be clear and limpid. No further operation was done, and the man recovered.

Dr. FORMAD suggested the examination of pleuritic effusions for albumen, believing that the estimation of the quantity of the latter would determine the prognosis of the serous effusions. He had several times examined hydrocephalic effusions tapped by Dr. Detmold, of New York, without finding any trace of albumen; and also, in a similar case, operated upon by Dr. Pepper, at the University Hospital, he found only a trace of albumen. Having examined also a number of fluids tapped from cases of pleuritic effusions, ascites, hydroceles, etc., he ascertained that, while some of them were loaded with albumen, in most of the fluids there was only a small amount, and in a few no trace even of albumen could be detected. Two cases of pleuritic effusion, in which a large quantity of albumen was present, he knew to have terminated fatally. It is a known fact that the quantity of albumen in exudations is always in direct proportion to the intensity of the inflammation, and that exudations (sometimes in large amount) in congestive conditions contain little or no albumen, albumen being dependent upon the number of migrated cellular elements, which are few in the latter condition. The albumen in cystic fluids is dependent upon another source, viz., that of a mucoid degeneration of tissues.

Dr. TYSON thought Dr. Formad's statement in the main correct, but it went too far. That albumen is invariably present in inflammatory effusions is undoubtedly correct, and that it is absent in many non-inflammatory effusions is also correct; but non-inflammatory effusions also occur which contain a considerable proportion of albumen. He was

aware that the view of Dr. Formad was to be found in some of the text-books, but thus expressed it is erroneous.

Dr. HODGE calls attention to the fact that in ovarian dropsy we have a fluid in which the amount of albumen is very abundant without there having been any symptoms of inflammation of the cyst.

Dr. HENRY remarked, in conclusion, that his paper had reference solely to inflammatory effusions. It was evident that there was some misunderstanding in the discussion, although those who had heard the whole paper would probably recall the fact that nothing whatever had been said in regard to non inflammatory effusions. Dr. Henry now regretted that, for the sake of brevity, he had caused only a portion of the title of his paper to be printed on the notices of the meeting. It was announced as a paper on "Some of the Causes Determining the Nature of Pleuritic Effusions," which would, of course, include hydrothorax.

The discussion had wandered very wide of the point. The proper method of refuting the views advanced was to show that the experiments of Ludwig upon the pulmonary circulation and those of Cohnheim upon embolic processes are unreliable, or to point out some flaw in the arguments, which are entirely based upon these experiments. This had not even been attempted. Exceptional cases of pleurisy and empyema, attended with remarkably few symptoms, cases which are now readily recalled to the memory on account of their exceptional nature, are brought forward by way of argument, but are hardly entitled to be so received.

In reply to both Dr. O'Hara and Dr. Wilson, Dr. Henry would say that, while giving prominence to one set of causes determining the nature of pleuritic effusions, he had by no means omitted to refer to constitutional conditions as concerned in the conversion of a sero-fibrinous into a purulent effusion. "Pyæmia, septicæmia, and the infectious diseases" are distinctly mentioned as predisposing to such a change, and it will surely be recalled by some present, that one case, illustrating the effect of constitutional causes upon the nature of the effusion, is referred to at some length. Finally, in reply to the remarks of Dr. Eskridge, who so emphatically dissents from the results of Ludwig's experiments, Dr. Henry would say that a mere statement of unbelief in the experiments of so distinguished a physiologist is not sufficient to refute them.

SUPPOSITORIES IN VAGINISMUS.—

℞ Ol. theobromæ, ʒi;
Potassii bromidi, gr. x;
Ext. belladonnæ, gr. vi;
Acid. thymici, gr. i.—M.
Fiat in suppositor. no. i.

To be placed in the vagina every evening.

MISCELLANY.

PROFESSOR JAMES AITKEN MEIGS.—James Aitken Meigs, M.D., Professor of Physiology and the Institutes of Medicine in the Jefferson Medical College, died at his residence in this city on November 9, 1879, in the 51st year of his age. He had been ill with what appeared to be a severe malarial attack for a few days, but his death was preceded by evidences of blood-poisoning. No post-mortem examination was permitted; the immediate cause of death must therefore remain a subject for conjecture, heart-clot, portal phlebitis, and discharge of hepatic abscess into the vena cava having each been suggested.

Professor Meigs was born in this city in 1829, of English and Scotch ancestry. He graduated in Jefferson Medical College in March, 1851. He then began practice in this city, where he since pursued it until his death. For several years he acted as assistant to the Professor of Physiology in the Pennsylvania College, and engaged in the examination and preparation of students for graduation. In September, 1854, he was appointed Professor of Climatology and Physiology at the Franklin Institute, holding the position for eight years, during which time he also lectured frequently on physiological and ethnological subjects at the different mechanics' institutes in Philadelphia, and before various literary associations in neighboring cities.

In 1857 he accepted the chair of Institutes of Medicine in the Philadelphia College of Medicine, and occupied it until April, 1859, when he was transferred to the Professorship of Institutes in the medical department of the Pennsylvania College, previously held by Professor F. G. Smith, for whom the chair was originally created by the trustees of the parent institution at Gettysburg. In November, 1859, while still connected with the Pennsylvania College, he was elected Consulting Physician and Clinical Lecturer to the Philadelphia Hospital. On the breaking out of the civil war, in 1861, he, in company with his colleagues, resigned from the Pennsylvania College. In June, 1868, he was elected by the Board of Trustees of Jefferson Medical College Professor of the Institutes of Medicine and Medical Jurisprudence. In August of the same year the Board of Managers of the Pennsylvania Hospital chose him, without the usual canvass, one of the physicians of that institution. These two positions he still held until his death.

He was a member of the Philadelphia County Medical Society, of which he was elected Recording Secretary in 1857, and a year later Corresponding Secretary, to which office he was twice re-elected, becoming in 1867, moreover, one of the Vice-Presidents, and in 1871 the President. He was a member of a number of American medical and scien-

tific associations and of the Société d'Anthropologie de Paris, the Ethnological and Anthropological Societies of London, the Societas Medicorum Sveçarræ, of Stockholm, and the International Congress of Prehistoric Archæology.

While a student of medicine, and for some time after his graduation, Professor Meigs contributed to the *Medical Examiner* clinical reports of cases treated at the Jefferson College and the Pennsylvania Hospital, the discussions of the Philadelphia County Society, and papers on the mortuary statistics of Philadelphia. He wrote and published many articles of considerable merit, among them being one on the physiology of stammering and its treatment by mechanical means. In 1856 he prepared an appendix to the first American edition of Carpenter's work on the microscope. The following year, being Chairman of the Standing Committee on Anthropology, he arranged and classified the extensive collection of human crania in the Academy of Natural Sciences, and prepared a systematic catalogue of the collection, which was published by the Academy.

He also contributed during 1857 to Nott and Gliddon's "Indigenous Races of the Earth" an essay on the cranial characteristics of the races of men, presenting a general survey of human skulls in their ethnical relation, and edited an American edition of Kirke's "Manual of Physiology." To the Proceedings of the Academy of Natural Sciences, the Reports of the Smithsonian Institution, and other like publications, he contributed at various times many original and interesting articles on craniology. He likewise contributed numerous reviews on a great variety of physiological, medical, and scientific subjects to the *Medical Examiner*, the *North American Medico-Chirurgical Review*, and the *American Journal of the Medical Sciences*, and prepared for Professor Gross's "American Medical Biography" the memoir of Dr. Randolph.

At the last Commencement Professor Meigs delivered the valedictory address to the graduating class of the Jefferson College. It was in the form of an epic poem, celebrating the nuptials of the Young Physician and Fair Hygeia.

While librarian to the Academy of Natural Sciences, Dr. Meigs distinguished himself by his zeal and great industry in ethnological studies, especially in regard to the cranial characteristics of different races, in which field he appears to have made his only original contributions to science. The papers which he then published attracted the attention of foreign observers, and established his continental reputation and gave him honorary membership in a number of foreign societies. In his lectures at the Pennsylvania College he repeated all of Brown-Séquard's physiological experiments and many of those of Bernard, whom he greatly admired and held in great esteem. Since that time he had abandoned vivisection, preferring to illustrate his lectures by means of the camera and diagrams.

In the lecture-room Professor Meigs appeared to his best advantage. Deeply interested in his subject himself, he spared no pains to make his lectures attractive to his students by careful preparation and abundant illustration. His use of the stereopticon as a means of explaining his subject was extremely fortunate. His lectures delivered a year ago, upon the eye and the ear, will long be remembered by those who heard them for their faithful representation of the latest contributions to the anatomy and physiology of these organs: they probably have never been excelled in this country. This winter he began his lectures with the subject of "Reproduction," and it gave promise of being an unusually brilliant course. When lecturing he was nervous and animated; he made no effort at oratorical display, but kept ever before him the idea simply of communicating information; his style was therefore plain and unpretending, though not unpolished; he possessed a free flow of language, but was cautious in expressing his views upon facts which he considered not fully established. Always affable and sympathetic in his manner, naturally kind and obliging in his disposition, ever ready to answer questions and freely communicate the results of his laborious studies, he was not only regarded as a friend by the students, but possessed the confidence and regard of his colleagues and the profession and community at large.

In his thirty years' practice he was very successful, having devoted himself to it very closely; indeed, for a number of years he scarcely permitted himself any relaxation whatever. At one time he attended nearly two hundred and sixty obstetrical cases in the course of twelve months. The cause of science has suffered from these engrossing cares, which he never could be prevailed upon to resign. His bodily health, like his mind, was unusually vigorous, but it yielded at last with such suddenness as to make it evident that his constitution had been undermined by nights devoted to study and days consumed by constant toil.

The resolutions adopted by various societies upon the announcement of the death of Professor Meigs attest the high appreciation in which he was universally held as a man of science, as a successful teacher, and as a cherished friend. F. W.

THE following preambles and resolutions were adopted by the Philadelphia County Medical Society on the announcement of the death of Prof. J. A. Meigs:

WHEREAS, The Philadelphia County Medical Society has lost, by the death of Dr. John Aitken Meigs, an old and highly-valued member and ex-president of the Society, who has been taken suddenly away from his career of usefulness; and

WHEREAS, We have ever recognized in him one who, from his first entrance upon the field of medical science, devoted his time and talents, with exceptional zeal and industry, to the acquisition of knowledge, of whatever kind and from whatever source attainable, that could in any degree prepare him for a more perfect and conscientious discharge of the duties of a most responsible profession; and

WHEREAS, The fulfilment of his exalted aims has been signally manifested in the success of his earlier and later efforts in behalf of rational and scientific medicine, establishing for himself, as he did by devotion to the investigation and solution of intricate questions pertaining to medicine, a reputation not only coextensive with our own, but that has extended to foreign lands: therefore,

Resolved, That it is eminently proper that this Society should, and hereby does, express its sense of the loss sustained in the sudden death of one who, with talent of no ordinary character and acquirements that only a few possess, was yet so simple in manner and conversation, so unassuming, affable, and frank in deportment, as to attract and interest all with whom he came in contact.

Resolved, That a copy of these preambles and resolutions be transmitted to the aged and bereft parent of the deceased, and that they be published in the medical and in the daily papers.

CHLORIDE OF LIME, in the proportion of one ounce to a wine-quart of water, is said to be very useful for cleansing dirty bottles. They should be filled with the solution and allowed to stand for a day or two. The same solution may be used repeatedly.

NOTES AND QUERIES.

SPARTANBURG, S.C., November 3, 1879.

MR. EDITOR,—In all popular belief there is very frequently some foundation of truth. As an evidence of this I will relate a fact antedating the use of "Ingluin." Over twenty years ago I attended a patient with a bilious attack; the nausea and vomiting were incessant for days, and though checked at times, yet could not be subdued by my remedies. She lived many miles from me. Upon one of my usual visits, I found her bright and entirely relieved. Hoping that my medicines had at last proved effectual, you may guess my surprise and disgust when I was told that my prescriptions had not been used for twelve hours; a neighboring female had visited her, dosed her with "gizzard-tea," and cured her! Investigating the subject, I found that the country-people were in the habit of saving the poultry's gizzards, divesting them of the inner membranes, which were then hung up to dry. Whenever a person was attacked with vomiting, especially during pregnancy, this membrane was pulverized and given in tea. The rural population have an abiding faith in its virtues. This was recalled to my memory by the now general use of "Ingluin."

Respectfully yours,

L. C. KENNEDY.

OFFICIAL LIST

OF CHANGES OF STATIONS AND DUTIES OF OFFICERS OF THE MEDICAL DEPARTMENT U.S. ARMY FROM NOVEMBER 1 TO NOVEMBER 15, 1879.

SUTHERLAND, CHARLES, COLONEL AND SURGEON.—Having reported at Division Headquarters as Medical Director of the Division, is assigned to duty at the Presidio of San Francisco, Cal., from this date. S. O. 134, Division of the Pacific and Department of California, October 24, 1879.

KING, WM. S., LIEUTENANT-COLONEL AND SURGEON.—The extension of his sick-leave of absence granted him March 6, 1879, from A. G. O., is further extended six months on account of sickness. S. O. 254, A. G. O., November 8, 1879.

IRWIN, B. J. D., MAJOR AND SURGEON.—Having reported for duty at these Headquarters, he is assigned to duty at Fort Meade, Dakota T. S. O. 116, Department of Dakota, October 21, 1879.

WOLVERTON, W. D., MAJOR AND SURGEON.—Assigned to duty at Fort A. Lincoln, Dakota T. S. O. 115, Department of Dakota, October 18, 1879.

GIBSON, J. R., MAJOR AND SURGEON.—Having reported at these Headquarters, to proceed to Fort McHenry, Md., and report to the Commanding Officer for duty. S. O. 192, Department of the East, October 28, 1879.

TREMAINE, W. S., CAPTAIN AND ASSISTANT-SURGEON.—The leave of absence on Surgeon's certificate of disability granted him in S. O. 214, October 27, 1879, from Headquarters Department of the Missouri, is extended two months on Surgeon's certificate of disability. S. O. 255, A. G. O., November 11, 1879.

MEACHAM, FRANK, CAPTAIN AND ASSISTANT-SURGEON, Fort Brown, Tex.—Granted leave of absence for one month. S. O. 236, Department of Texas, November 8, 1879.

CALDWELL, D. G., CAPTAIN AND ASSISTANT-SURGEON.—Upon withdrawal of troops from Fort Independence, to report to Commanding Officer, Fort Warren, Mass., for duty as Post-Surgeon. S. O. 165, Department of the East, October 20, 1879.

MUNN, C. E., CAPTAIN AND ASSISTANT-SURGEON.—To take post at Fort Hays, Kans., and, after reporting there, to proceed to Fort Garland, Col., and report to Colonel McKenzie, Fourth Cavalry, for duty with the column now organizing there. S. O. 217, Department of the Missouri, October 30, 1879.

CARVALLO, C., CAPTAIN AND ASSISTANT-SURGEON.—To report in person to Col. Albert G. Brackett, Third Cavalry, commanding troops at Rawlins, Wyo. T., for duty with his command. S. O. 102, Department of the Platte, November 10, 1879.

ELBREY, F. W., CAPTAIN AND ASSISTANT-SURGEON.—Relieved from duty in Department of the South, and to report in person to the Commanding General, Department of the Missouri, for assignment to duty. S. O. 254, c. s., A. G. O.

HALL, J. D., CAPTAIN AND ASSISTANT-SURGEON, Fort Concho, Tex.—Granted leave of absence for one month on account of sickness. S. O. 221, Department of Texas, October 20, 1879.

HAVARD, V., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Granted leave of absence for one month from 25th instant, with permission to apply for one month's extension, provided he furnishes satisfactory medical attendance to the command at Fort Johnston, N. C., at his own expense. S. O. 168, Department of the South, November 10, 1879.

COMEGYS, E. T., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Assigned, temporarily, to duty as Post-Surgeon at Fort Duncan, Tex. S. O. 231, Department of Texas, November 3, 1879.

KILBOURNE, H. S., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Assigned to duty as Post-Surgeon at Fort Porter, N.Y. S. O. 189, Department of the East, October 24, 1879.

HALL, WILLIAM R., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Upon the termination of his services at Camp Winfield Scott, Wyo. T., to proceed to and take station at Fort Cœur d'Alène, Idaho. S. O. 142, Department of the Columbia, October 10, 1879.

PORTER, J. Y., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Granted leave of absence for five months. S. O. 254, c. s., A. G. O.

APPEL, D. M., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Relieved from duty at Fort Stanton, and assigned to duty at Fort Bayard, N. Mex., as Post-Surgeon. S. O. 109, District of New Mexico, October 31, 1879.

SHUFELDT, R. M., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Relieved from duty at Fort Laramie, and assigned to duty as Post-Surgeon at Fort Fetterman, Wyo. T. S. O. 98, Department of the Platte, October 29, 1879.

APPEL, A H., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Assignment to duty at Fort Bennett revoked, and to repair to Fort Pembina, Dakota T., and report to the Commanding Officer for duty as Post-Surgeon. S. O. 118, Department of Dakota, October 27, 1879.

RICHARD, CHARLES, FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Relieved from duty at Fort Buford, Dakota T., and to report to Commanding Officer, Fort Snelling, Minn., for duty at that post. S. O. 124, Department of Dakota, November 2, 1879.